Great Lakes CoastWatch Program

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**CILER** Cooperative Institute for Limnology and Ecosystems Research

GOAL

CoastWatch is a nationwide National Oceanic and Atmospheric Administration (NOAA) program within which the Great Lakes Environmental Research Laboratory (GLERL) functions as the Great Lakes regional node. In this capacity, GLERL obtains, produces, and delivers environmental data and products for near real-time observation of the Great Lakes to support environmental science, decision making, and supporting research. This is achieved by providing access to near real-time and retrospective satellite observations and in-situ Great Lakes data. The goals and objectives of the CoastWatch Great Lakes Program directly support NOAA's statutory responsibilities in estuarine and marine science living marine resource protection, and ecosystem monitoring and management.

INTRODUCTION

GLERL is currently receiving a product suite of 158 enhanced digital images including satellite-derived surface temperature (see below), visible and near-infrared reflectance, brightness temperatures, cloud masks, and satellite/solar zenith angle data from the NOAA/ **AVHRR** (Advanced Very High Resolution Radiometer) series of satellites as well as **GOES** (Geostationary Operational Environmental Satellites) visible, near infrared, water vapor, and SST data. These products are acquired by GLERL from NOAA's National Environmental Satellite, Data, and Information Service (NESDIS) on a daily schedule via the Internet. In addition, **MODIS** true color 250m resolution imagery of each Great Lake is received near real-time from the Space Science and Engineering Center at the University of Wisconsin. In-situ and modeled data, including marine and meteorological observations, buoy observations, water level gauge measurements from NOAA's National Ocean Service, and Great Lakes Surface Environmental Analysis (**GLSEA**) composite charts, are routinely acquired or produced, stored, and made available to Great Lakes CoastWatch data users. Great Lakes Forecasting system (nowcast and forecast) products are also available to CoastWatch data users. Near real-time AVHRR satellite data for the past 2 weeks are available at GLERL, and access to a retrospective archive that begins in 1990 is available via an Internet link to the NOAA CoastWatch Active Access System at the NESDIS Satellite Active Archive.
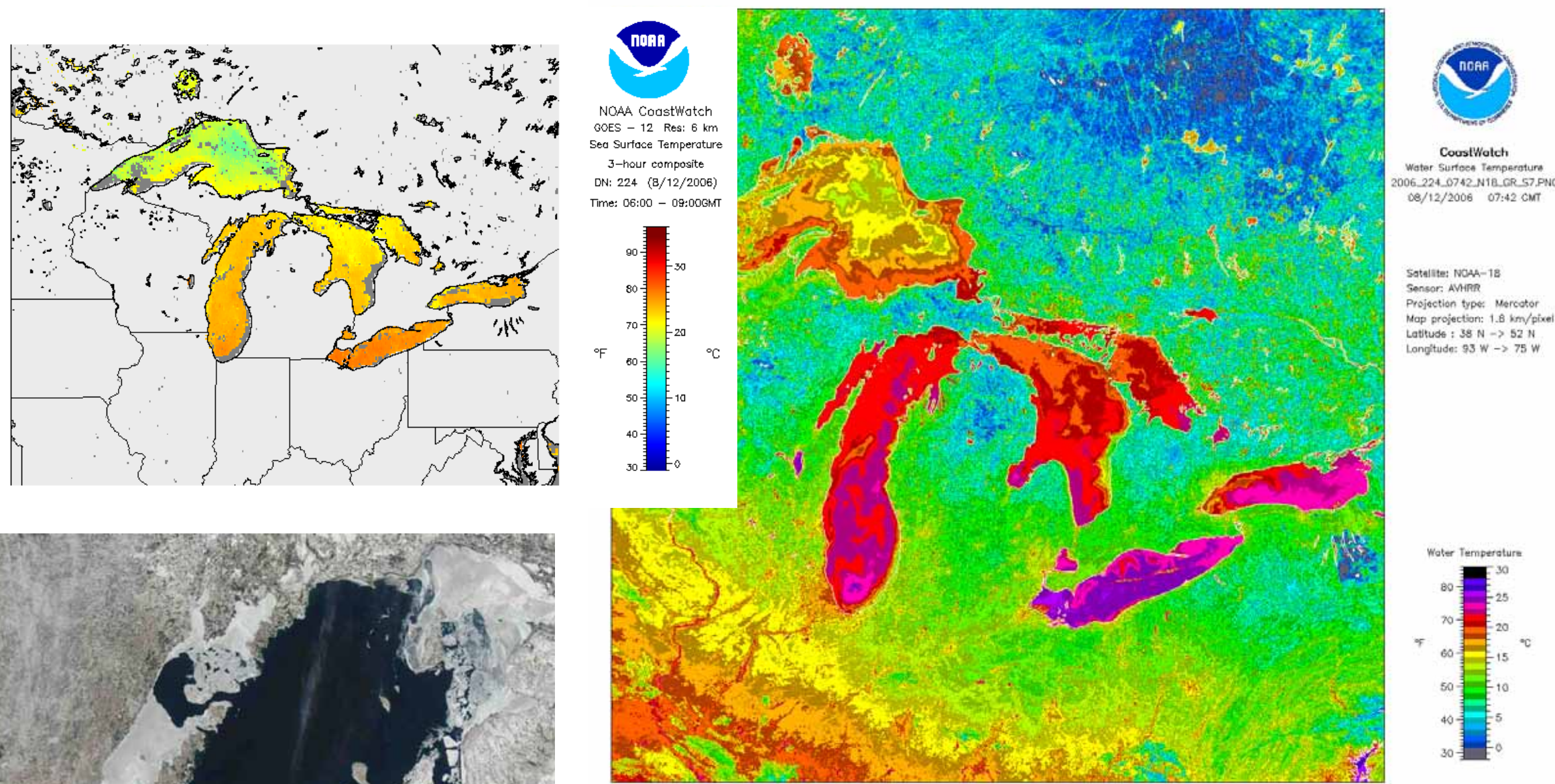

AVHRR surface temperature image (above) and GOES sea surface temperature (above left).
MODIS high-resolution true color images (left and below).

USERS

The CoastWatch node at GLERL provides clients including Federal, state, and local agencies, academic institutions, commercial/industries, and the public, both within and outside of the Great Lakes region, with access to near real-time satellite observations and in-situ data for the Great Lakes. CoastWatch data are used in a variety of ways, including near real-time observation and tracking of algal blooms, plumes, ice cover, wind, water intake temperatures at fish hatcheries, two and three dimensional modeling of Great Lakes physical parameters such as wave height and currents, damage assessment modeling, research, and educational and recreational activities. In addition, through a cooperative project with Michigan Sea Grant, Great Lakes CoastWatch satellite-derived surface temperature imagery is contoured and made available via Michigan State Sea Grant's web site. Great Lakes CoastWatch data and products benefit riparians as well as commercial and recreational users.
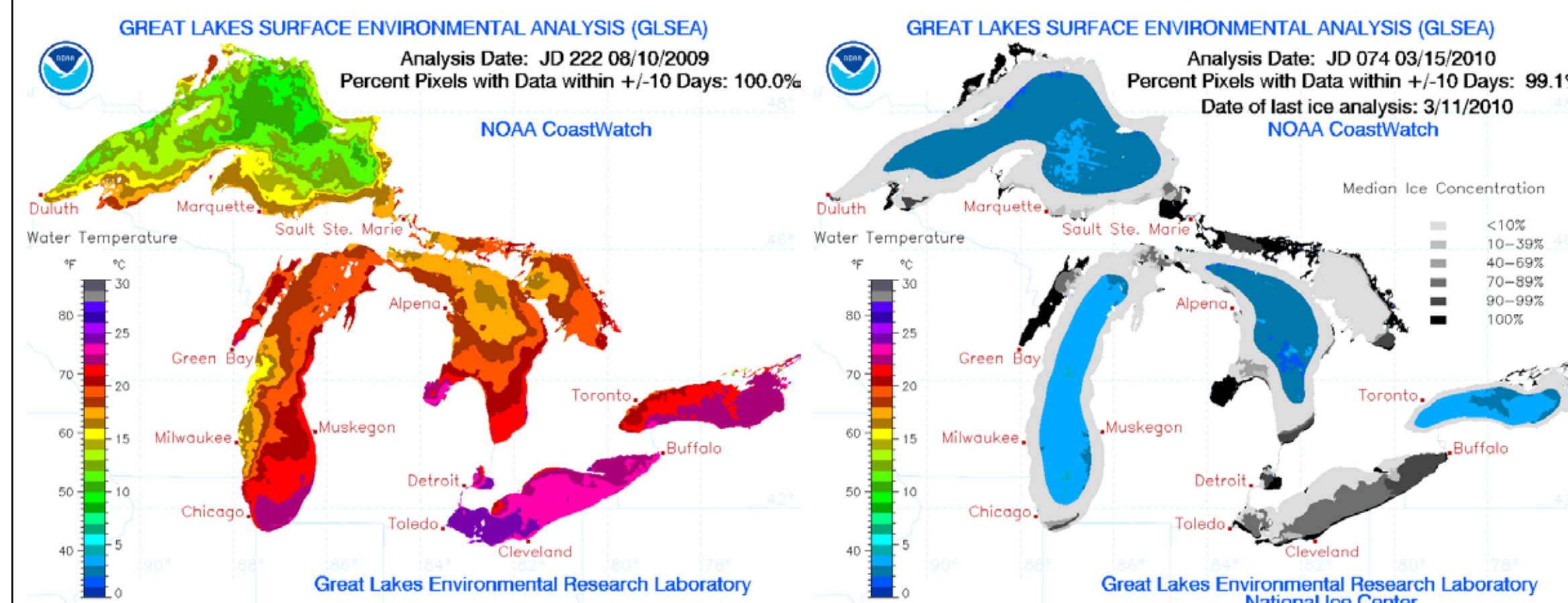

Examples of GLSEA images. Water temperature during summer (August 10, 2009, (left), and winter (March 15, 2010). Winter image also includes ice cover concentration.
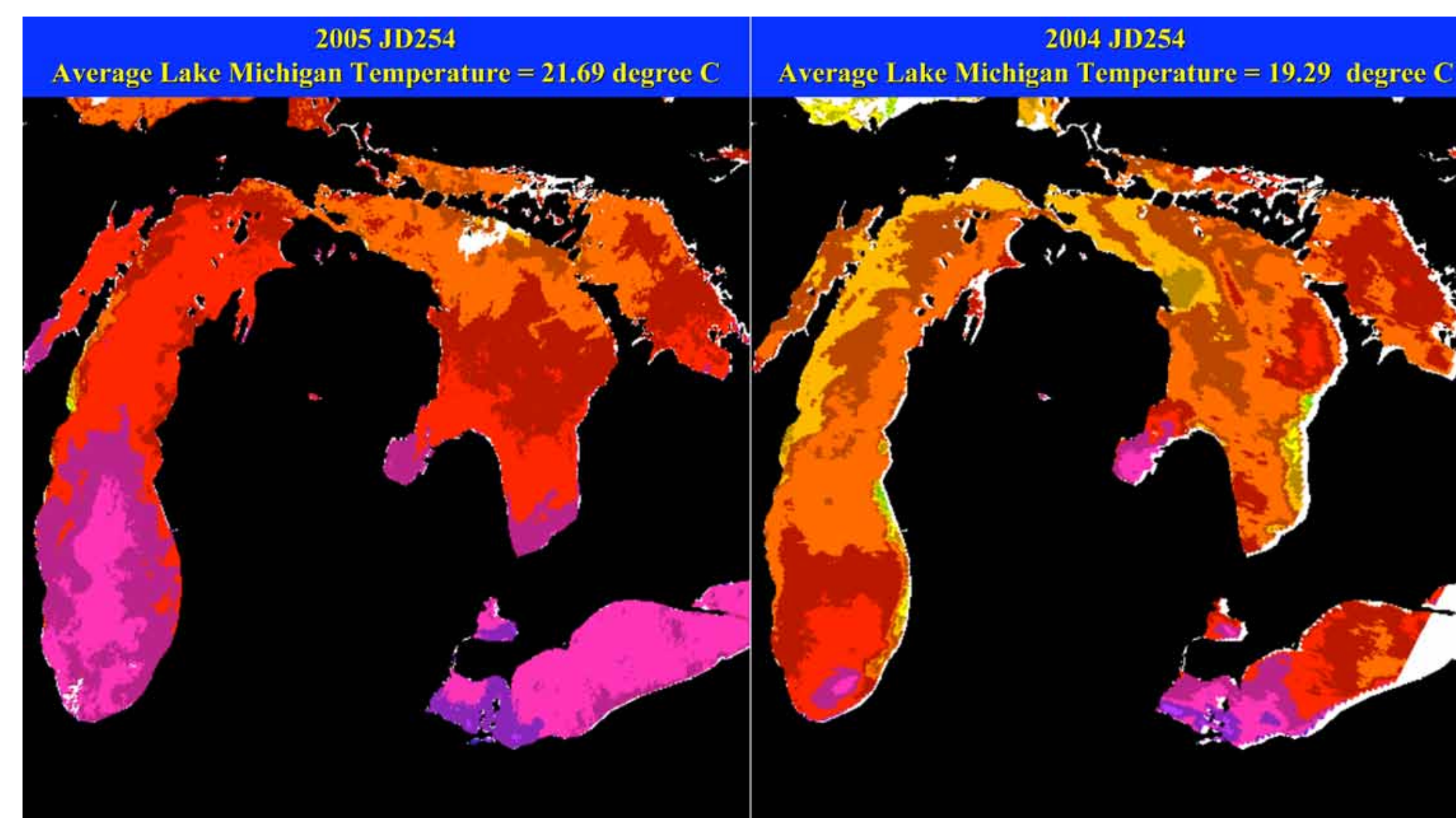
Examples of Lake Michigan and Lake Huron AVHRR Imagery that has been GeoTiff Cloud Masked and Land Masked. Notice the 2.5 degree temperature difference between years.
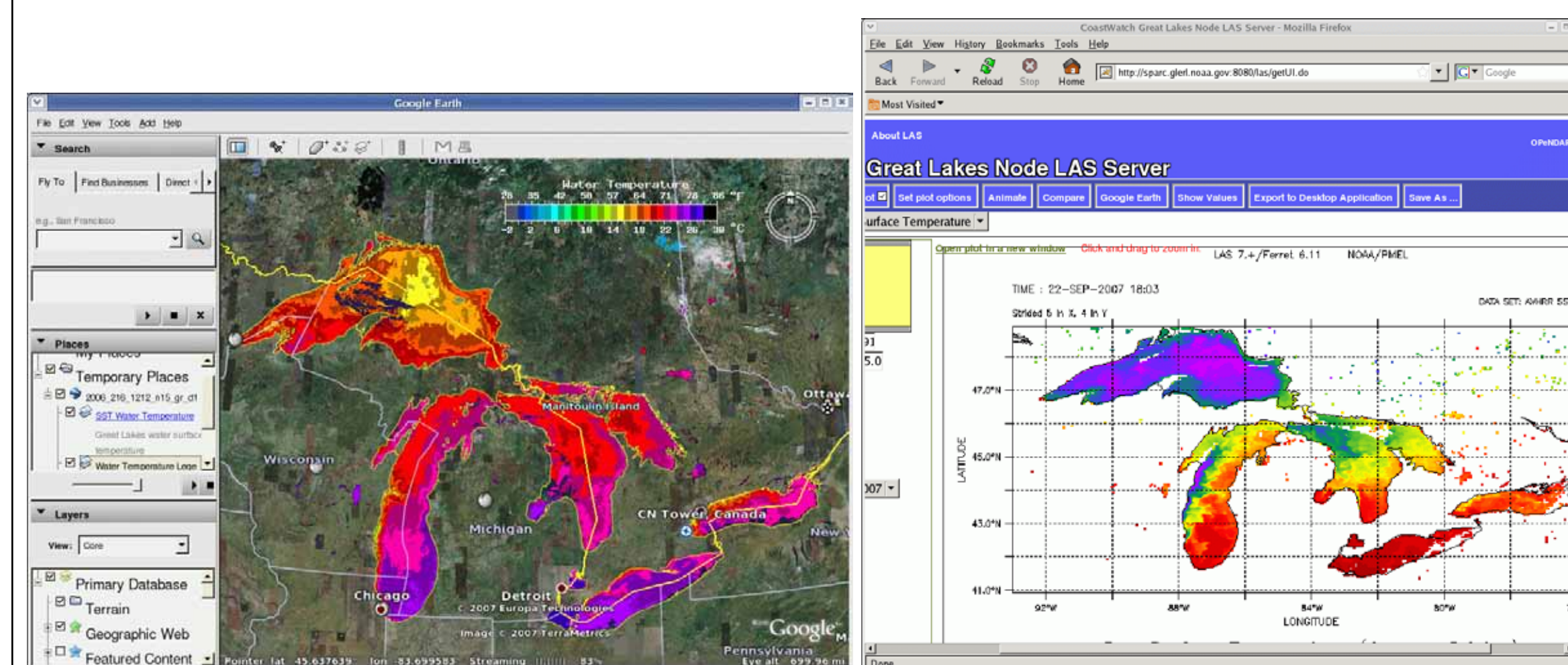

GLSEA composite chart in Google Earth (left). Proposed new CoastWatch THRDDS/LAS server (right).
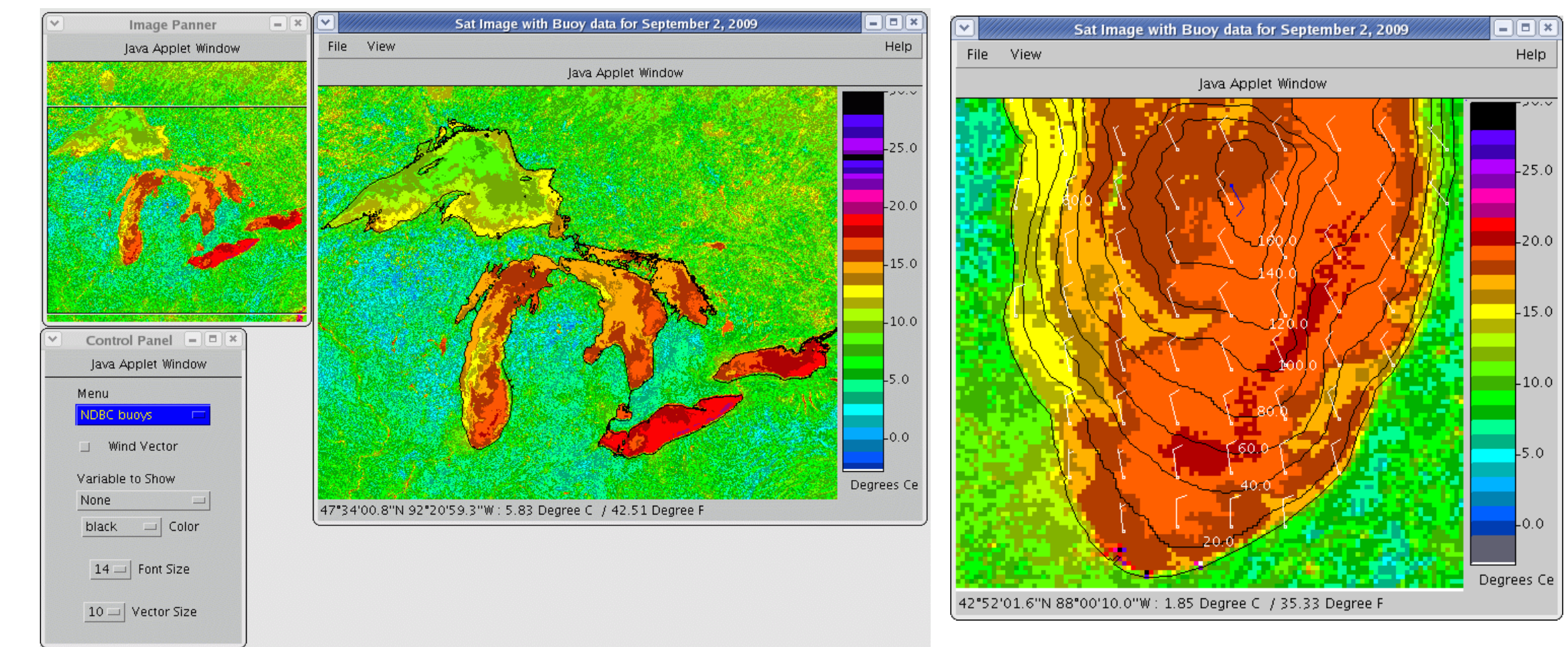
A new utility, based on a JAVA applet, allows on-line interactive retrieval of physical parameters such as surface temperature, ice cover, winds, and bottom depth at a given location in an image, which enhances the accessibility and utility of Great Lakes CoastWatch data. The applet is initiated using the JAVA GIS button on the Great Lakes CoastWatch home page. A window will appear in which you can select an image type and date, overlay (shapefile) data, or the URL of a custom shapefile to be viewed. Current image data includes near real-time NOAA AVHRR surface temperature data, Channel 1 visible reflectance data, GLSEA cloud-free composited surface temperature data, and Great Lakes bathymetry. Ice cover concentration data is available during the winter season. Shapefiles includes shoreline, bathymetry, and land mask overlays. In addition, near real-time NOAAPort marine observation data at buoy, CMAN, and Coast Guard shore station locations and/or nowcast or forecast gridded winds (at the hour of the displayed satellite image) can be displayed and observed values obtained by moving the cursor over the station or wind vector of interest.

FUTURE PLANS

Future products derived from new satellite sensors such as synthetic aperture radar (SAR), scatterometer, and ocean color sensors are being developed including ice-type classification and mapping, high resolution winds, and chlorophyll/HAB mapping (see examples below).
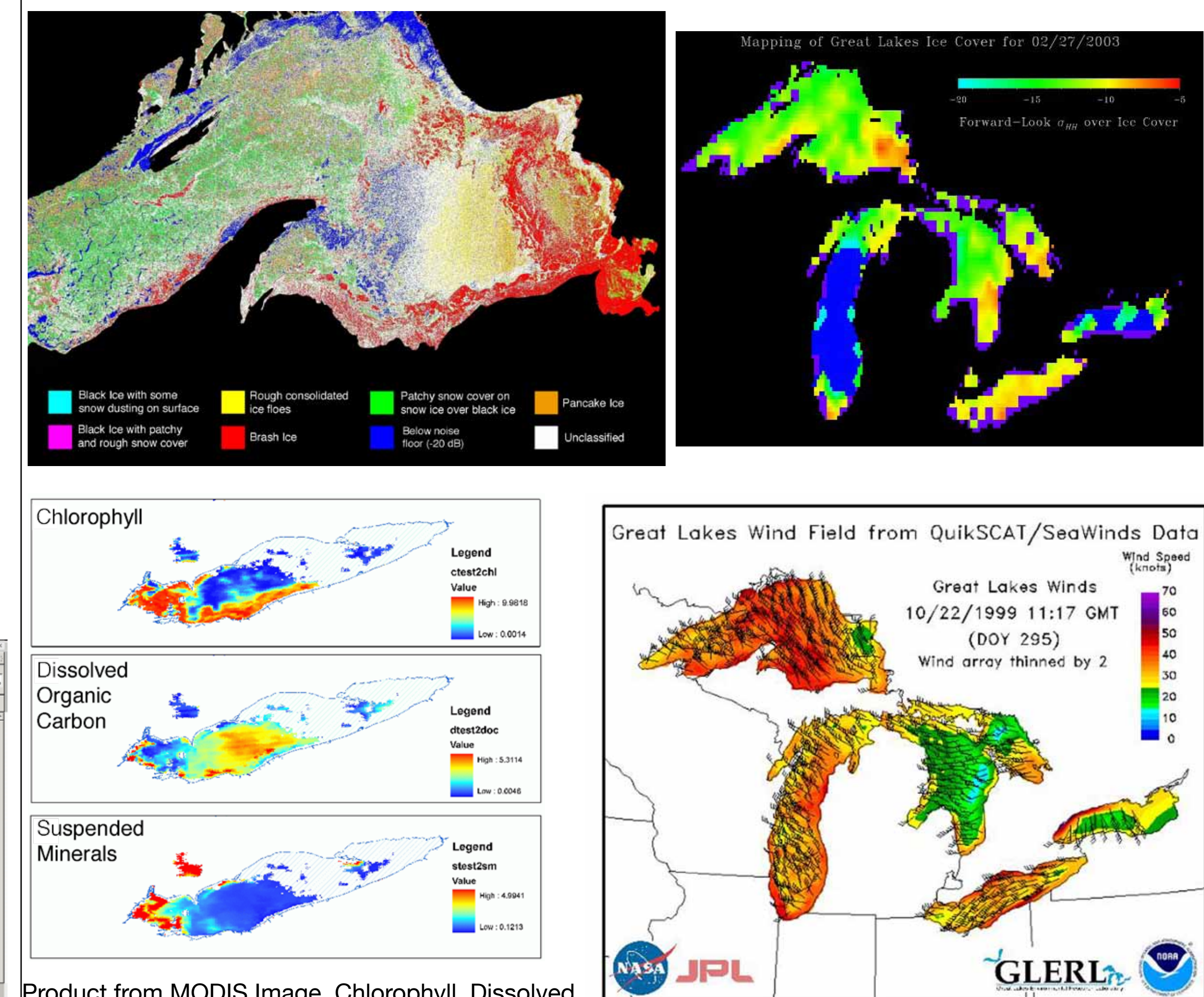
Product from MODIS Image. Chlorophyll, Dissolved Organic Carbon, and Suspended Minerals.

http://coastwatch.glerl.noaa.gov